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A new genus and species of oonopid spider (Araneae, Oonopidae) from Ukraine

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Abstract

The new genus and species *Spinestis nikita*, **gen. n.** and **sp. n.** from the Crimea, Ukraine is described from both sexes. The new genus resembles *Tapinesthis* and *Megaoonops.* The type species of these genera are illustrated. The conformation of the male palp and endogyna in Oonopidae are briefly discussed. The relationships of *Spinestis*, **gen. n.**, *Megaoonops, Oonopinus, Oonops* and *Tapinesthis* are discussed.

Keywords

Psembolus, stylus, spermatheca, receptaculum, taxonomy, *Oonopinus angustatus*, *Megaoonops avrona*, *Tapinesthis inermis*

Introduction

This paper is the second in a series of joint studies of the Palaearctic Oonopidae. The first was devoted to the monotypic genus *Ferchestina* from the Russian Far East (Saaristo and Marusik 2004). In March 2002 the second author undertook a two-week collecting trip to the Crimea and visited several places on the eastern and western shores. Numerous oonopids were found in almost all the sites sampled, even though the group was previously unrecorded from the peninsula (cf. Mikhailov 1997; Kovblyuk 2003). Among hundreds of *Oonops pulcher* Templeton, 1835 (*sensu* Thaler 1981), there were a few specimens

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that were larger in size, paler in colour and had more pairs of tibial spines than *O. pulcher* (6 pairs compared to 4 in the latter species). Examination of the male palp revealed that its structure was very different from those known in *Oonops* Templeton, 1835 and related genera. Instead, it resembled more closely that of the European oonopid *Tapinesthis inermis* (Simon, 1882). For example, both *T. inermis* and the Crimean specimens have a conical, rather than globular bulb. However, careful comparison of *T. inermis* and the Crimean material revealed significant differences in leg spination, coloration, the shape of the terminal part of the bulb and the epigyne. Previously we studied almost all the types of European Oonopidae molles (=species without dorsal abdominal scuta) described by Simon (1882) and Dalmas (1916), but the new specimens from southern Ukraine resembled none of them. Therefore, in this paper we describe the new species in a new genus.

Material and methods

Specimens were photographed using an Olympus SZX12 stereomicroscope and Olympus Camedia C-5050 camera. The images were montaged using "CombineZM" image stacking software in the Zoological Museum, University of Turku. Photographs were taken in dishes with paraffin on the bottom. Different size holes were made in the paraffin to keep the specimens in the correct position. The epigynes were macerated either with KOH or lactic acid. Internal structures of the bulbus became more distinct after exposing the palp in lactic acid.

The type specimens are deposited in the Zoological Museum of Moscow State University (ZMMU; curator – KG Mikhailov) and the Zoological Museum, University of Turku (ZMUT; curator – S Koponen). The terminology follows Saaristo (2001, 2007), Saaristo and Marusik (2004) and Saaristo and van Harten (2006), with additional terms adopted from Burger et al. (2003).

Descriptions

***Spinestis*, gen. n.**
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Type species: *Spinestis nikita* Saaristo & Marusik, sp. n. from the Crimea.

Etymology: Derived from the words "spine" and *"Tapinesthis"* (an oonopid genus with a somewhat similar palp). The gender is feminine.

Composition: Only the type species.

Diagnosis: Members of this new genus can be easily distinguished from all know Palaearctic (at least Western Palaearctic) Oonopidae molles, by having 6 pairs of ventral tibial spines on legs I and II (Fig. 9). The male palp is similar to that of *Tapinesthis inermis* (which belongs to a spineless genus) due to the conical structure of the bulb (Fig. 27), but differs in having a stylus on the psembolus. The female genital area is also

rather different from other West Palaearctic Oonopidae molles, and particularly from the sympatric *Oonops pulcher* (*sensu* Thaler 1981), in lacking a distinct translucent receptacle. The endogyna with a thin, long, tube like receptaculum serves to easily differentiate *Spinestis*, gen. n. from all other Mediterranean Oonopidae.

Description: As for the type species.

Relationships. In terms of the habitus, this new genus resembles the generotypes of *Oonops* Templeton, 1835 and *Oonopinus* Simon, 1893. These three genera are similar in having lock-spines on the first two pairs of legs, and a stylus on the psembolus (only one European species attributed to *Oonops, O. domesticus* Dalmas, 1916, lacks a stylus. However, there are several significant differences: 1) *Spinestis*, gen. n. has a greater number of tibial spines (6 pairs) than any other oonopids (4–5 pairs in European *Oonops* sensu lato and *Oonopinus*); 2) The stylus (*St*) of the psembolus is fixed (unflexible) and strongly turned (it is flexible in *Oonops pulcher*, and never turned in *Oonopinus*); 3) All *Oonops* sensu lato and *Oonopinus* have a globular bulb, and the base of the psembolus is easily visible (Figs 28–29), whereas in the new genus the bulb is conical and the origin of the psembolus is inconspicuous. In addition, the vulva of *Spinestis*, gen. n. has an unusually long "receptacle" (*Se*), which has no widening in the terminal region.

The palpal bulb of the new species resembles that of *Tapinesthis inermis* (Fig. 23) and the recently described *Megaoonops avrona* Saaristo, 2007. In all three species it is conical, but all other characters are entirely different. *T. inermis* has no leg spines, has a more or less distinct pattern on the carapace (Fig. 12), a simple psembolus lacking a stylus (Figs 13, 27), with its opening on the tapering tip as in *Orchestina flagella* Saaristo et van Harten, 2006 or *Segestria* spp. (Segestriidae). The new genus differs from *M. avrona* in having lock-spines and by lacking spines on legs III and IV, having much shorter legs, possessing a stylus and several other characters. Females of the three genera have very different genitalia. In *T. inermis* the epigastric scutum is covered with dense hairs and has a large translucent pattern (Fig. 14). In *M. avrona* the receptacula are situated far from the epigastric furrow (Fig. 19). Aside from *Oonops s.l.*, *Oonopinus* and *Spinestis*, gen. n., lock-spines are known in *Ischnothyreus* Simon, 1893, *Ischnothyrella* Saaristo, 2001 and *Liyonneta* Benoit, 1979, These genera belong to two different genus groups of scutate oonopids (Saaristo 2001).

At present, it is unclear which genus of Oonopidae is most closely related to *Spinestis*, gen. n. on the basis of morphology, but the genus is more similar to *Oonops* and *Oonopinus* (due to presence of lock-spines, a stylus and in the shape of the epigyne) than it is to *Tapinesthis* or *Megaoonops*.

Distribution. South Crimea only, western and eastern shores.

***Spinestis nikita*, sp. n.**

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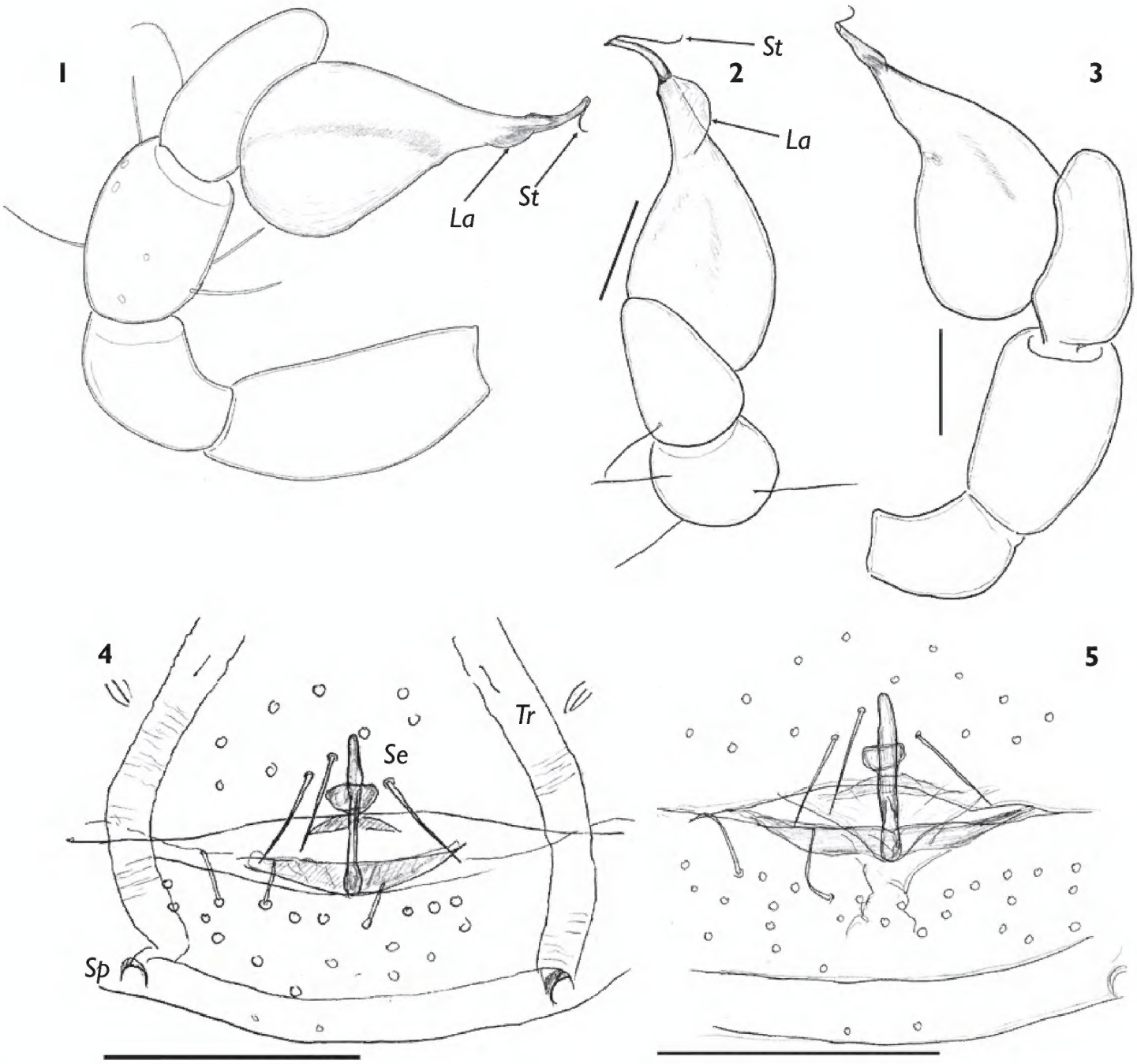
Figs 1–10, 20–22

Material examined: Holotype ♂ and paratypes 2 ♀ with label "UKRAINE, the Crimea, Nikita Vill., Nikitski Botanical Garden, 44°30′N 34°14′E, 5–70m, 11.03.2002 leg.



Figures 1–5. Copulatory organs of *Spinestis nikita*, sp. n.; **1–3** – male palp, retrolateral, dorsal and prolateral views respectively **4–5** – endogyna after maceration, ventral view. Scales = 0.1 mm.

Yu. M. Marusik" (ZMMU). Other paratypes: 1 ♂ and 1 ♀ same data (MZT AA 3.728); 1♂ (ZMMU) "UKRAINE, the Crimea, Cape Martyan Reserve, 44°30′N 34°15′E, 1–70m, 10.03.2002 leg. Yu. M. Marusik"; 1 ♂ and 1 ♀ (ZMMU) "UKRAINE, Crimea, env. of Balaclava, Aya Cape, 44°29′482″N 33°36′579″E, 170m, 14.03.2002 leg. Yu. M. Marusik".

Material was collected on open seashore slopes by sifting and hand picking among leaf and conifer needles. The exact habitat is unclear because this species was collected together with numerous *Oonops pulcher* Templeton, 1835 (*sensu* Thaler 1981), from which it seems indistinguishable in the field.

Etymology. The specific name is derived from the type locality - Nikita Village.

Diagnosis. As for genus.

Description. Both sexes with uniform pale orange coloration (Figs 6–7), lacking any pattern. After some years in alcohol a translucent pattern appeared on the dorsal and ventral aspects of the abdomen (Fig. 6). Carapace almost as wide as long, rather

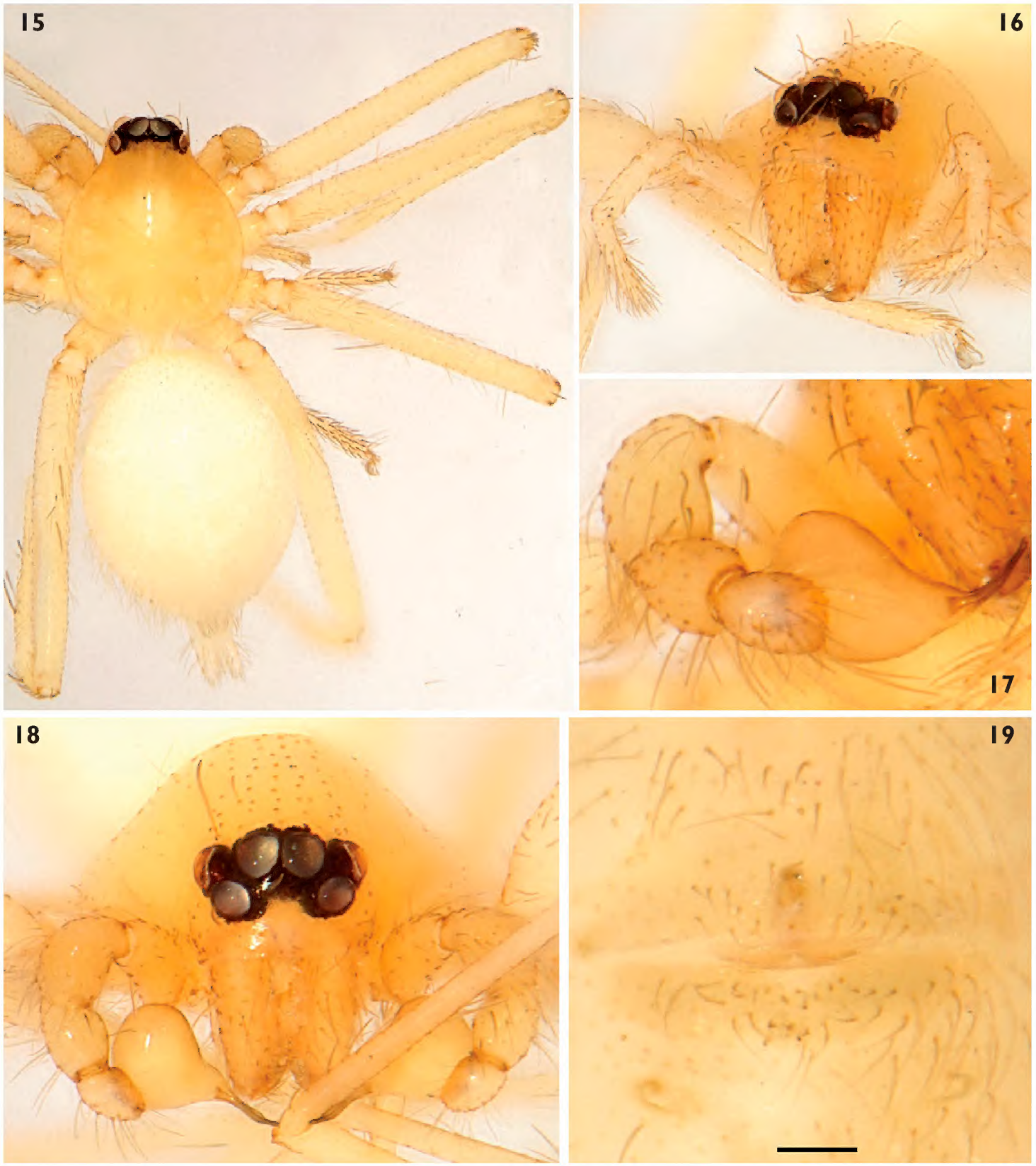
Figures 6–10. Habitus of *Spinestis nikita*, sp. n.; **6–7** female and male, respectively, dorsal view **8–9** female, ventral and lateral view respectively; **10** male, ventral view. Scales (if indicated) = 0.1 mm.

high, highest point in the posterior third (Fig. 9). Clypeus low, less than ½ of ALE diameter. Median eyes largest. Sternum shield-like (Fig. 10), unmodified, not touching the carapace. Female palp unmodified (Fig. 9). Male maxillae elongate (Fig. 10). Legs rather long, femora subequal to or longer than the carapace. Spines present on legs I and II. Femur I with 2 prolateral spines, tibiae I-II with 6 pairs of ventral spines, metatarsi I-II with 2 pairs of ventral spines (Fig. 9).

Palp as in Figs 1–3, 10, 20–21, relatively long, cymbium large, as long as tibia, longer than patella. Size of bulbus subequal to length of tibia+cymbium. Bulbus conical, gradually tapering, without a clear division between the bulb itself (tegulum) and the psembolus. Psembolus with fixed stylus (*St*), sharply turned (as if appearing to be broken) backwards-retrolaterally, tip of stylus slightly bent, without distinct barb. Psembolus rather simple, without any spines, with one thin membranous semiround lamella (*La*), more easily observed in dorsal view.

Figures 11–14. Habitus of *Tapinesthis inermis* from Belgium. **11–12** male and female, respectively, dorsal view **13–14** male and female, respectively, ventral view.

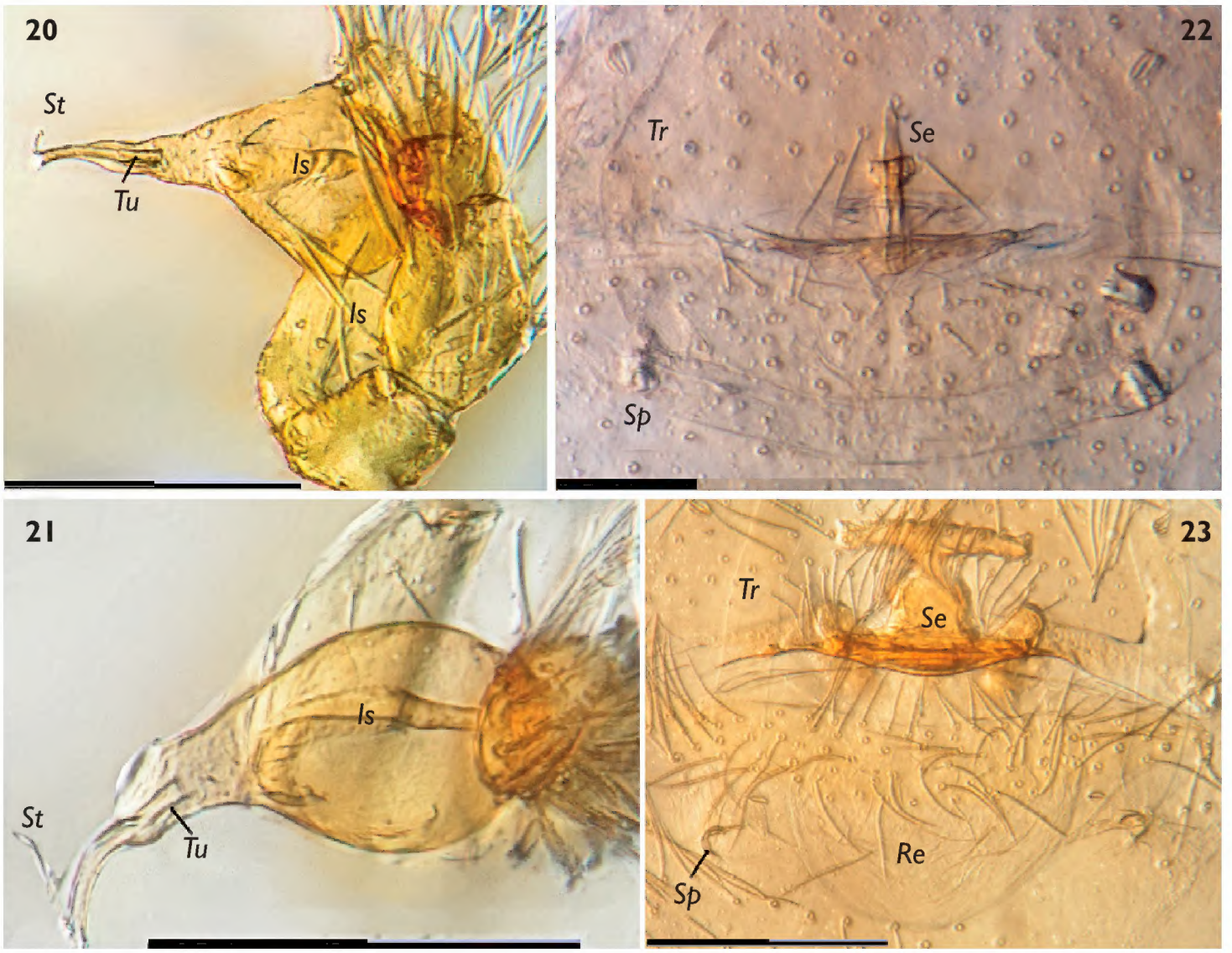
Female genital area lacking outgrowths, depressions or distinct pattern (Figs 4–5, 22), with short translucent longitudinal band above the epigastric furrow. Hairs in the genital area sparse, long; thick, short ciliate hairs on postepigastric scutum absent. Internal part (visible after maceration) consists of a long tube-like structure (*Se*,



Figures 15–19. *Megaoonops avrona* (paratypes). **15** male, dorsal view **16** female, frontal view **17** male palp, prolateral **18** male prosoma, frontal view **19** genital area of female.

spermathecae? *sensu* Burger et al. 2003) associated with a transverse plate. Behind the tube-like structure in the upper third is a transverse rectangular structure (anterior wall of the spermathecae? *sensu* Burger et al. 2003), seemingly connected to the tube. The rectangular structure is also associated with transverse chitinized "wings". Tracheal spiracles (*Sp*) are situated far from the epigastric furrow, tracheae (*Tr*) rather thin.

Measurements: ♂ - Total length 1.67, carapace: 0.71 long, 0.66 wide, 0.3 high; abdomen: 0.97 long, 0.57 wide; carapace width/length ratio 0.92, carapace height/length ratio 0.42, tibia I/carapace length ratio 0.9, femur IV/carapace length ratio



Figures 20–23. Copulatory organs after maceration of *Spinestis nikita* (20–22), sp. n. and *Tapinesthis inermis* (23, from Belgium) **20–21** male palp, prolateral and dorsal views respectively **22–23** endogyna. Scales (if indicated) = 0.2 mm.

1.14. Leg I: 0.71+0.29+0.64+0.51+0.29 = 2.44, Leg IV: 0.81+0.29+0.76+0.74+0.29 = 2.89, Chelicera 0.29 high, clypeus low, less than ½ of ALE diameter.

♀ - Total length 2.43, carapace 0.79 long, 0.71 wide, 0.33 high; abdomen: 1.31 long, 0.089 wide; carapace width/length ratio 0.91, carapace height/length ratio 0.42, tibia I/carapace length ratio 1.0, femur IV/carapace length ratio 1.1. Leg I: 0.74+0.29+0.79+0.53+0.29 = 2.63, Leg IV: 0.86+0.33+0.73+0.77+0.3 = 2.99.

Distribution. Southern shore of the Crimean Peninsula, Ukraine.

Discussion

Remarks on morphology of the copulatory organs.

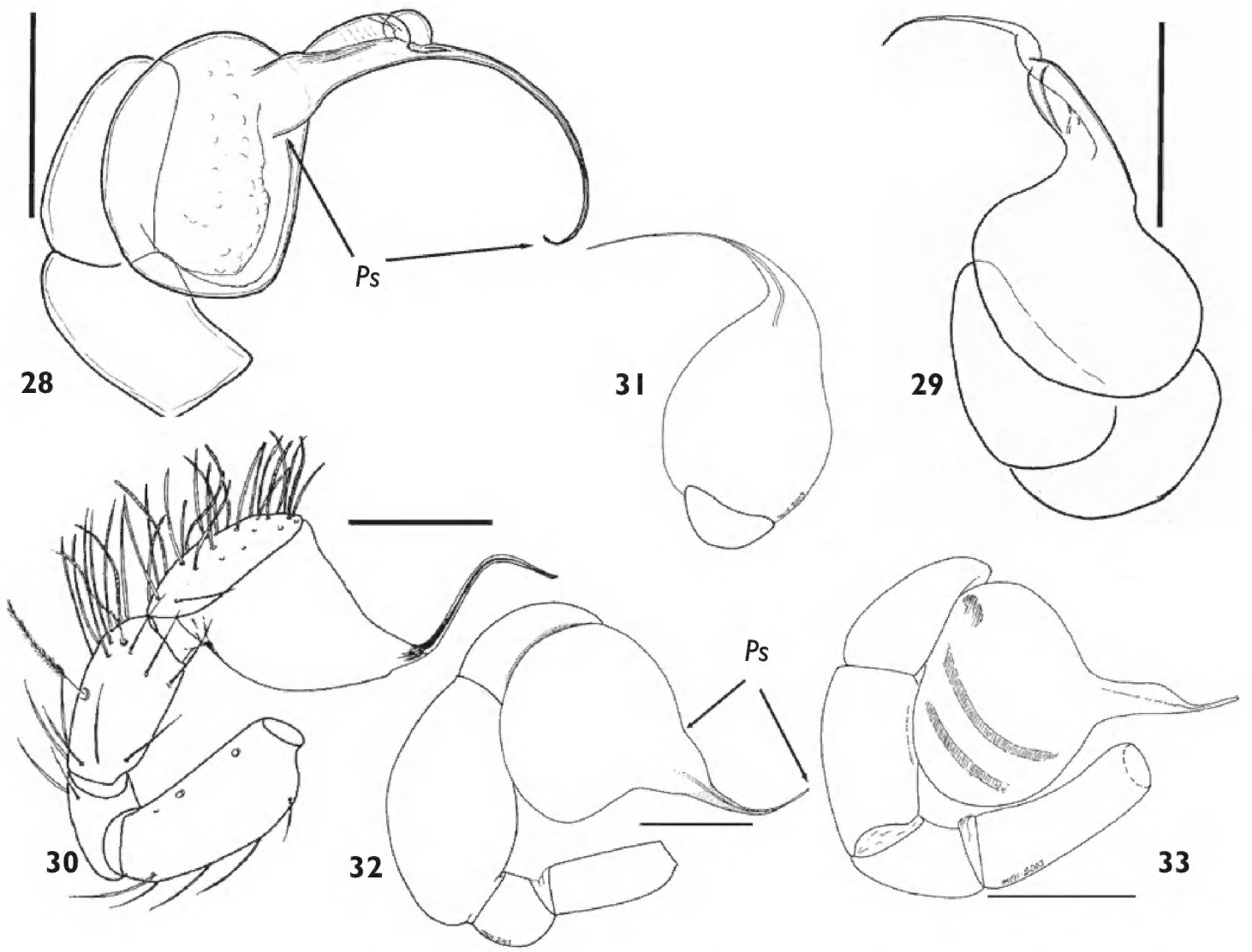
Psembolus: Since Saaristo and van Harten (2006: p.129) invented the term psembolus ("trunk-like, sometime filamentous outgrowth from its [bulb] frontal side"), it has become necessary to invent epithets to describe the morphological variation of this structure. The simple type occurs in *Tapinesthis inermis* and *Megaoonops avrona* Saaristo, 2007 (opening of seminal duct at the tip, bulb gradually turning into psembolus,

Figures 24–27. Macerated male palp of *Megaoonops avrona* (24–26, paratype) and *Tapinesthis inermis* (27, from Belgium). **24**, **27** prolateral view **25** retrolateral view **26** dorsal view. Scales (if indicated) = 0.2 mm.

Figs 24–27). More advanced, but still simple psemboli are found in several species: *Orchestina avrona* Saaristo, 2007, *O. sedotmikha* Saaristo, 2007, *"Oonopinus" kilikus* Saaristo, 2001 (Figs 30–33). In these species the psembolus is more or less clearly distinguishable from the bulb.

If the psembolus is different, for example, by having some outgrowths (spines, stylus, ridges) and/or invaginations (*fenestra* in *Opopaea*) and/or the seminal duct opening is not at the tip of the tapering psembolus, then this can be called a modified psembolus. The diversity of modified types of psemboli is high, yet poorly studied. It is unclear whether the simple psembolus is the primitive state or a derived form, but several species in the presumably most primitive group of Oonopidae, *Orchestininae* (a single subfamily in oonopids with a blunt seminal duct, as in all other spider families) have a simple psembolus. A simple psembolus is known among both extant and extinct *Orchestininae* (cf. Wunderlich 2004; Marusik and Wunderlich, 2008).

Seminal duct: All Oonopidae except Orchestininae (*Orchestina s.l.* (Fig. 33), *Gallorchestina* Wunderlich, 2008, *Burmorchestina* Wunderlich, 2008, *Canadorchestina* Wunderlich, 2008 and *Ferchestina* Saaristo & Marusik, 2004) lack a blind sperm duct (Saaristo and van Harten, 2006; Marusik and Wunderlich, 2008) and have a large sinus for storing sperm. There are two different types of connection between the sinus



Figures 28–33. Male palp of *Oonopinus angustatus* (28–29), "*Oonopinus*" *kilikus* (30), *Orchestina flagella* (31–32) and *O. sedotmikha* (33). **28, 30**, **32–33** retrolateral view **29**, **31** dorsal view. Scales = 0.1 mm.

and pore through which sperm can enter and leave the bulb. Most oonopids have a connecting duct formed by the walls of the psembolus, but *Tapinesthis inermis*, *Megaoonops avrona* and *Spinestis nikita*, sp. n. have an additional conical tube inside the duct (*Tu*, Figs 20–21, 24–27). This tube appears to hang on a sclerite (*Is*) connected to the base of the bulb (readily visible in *Spinestis*, gen. n. Figs 20–21). Inside the bursa (sinus) there is a kind of large sac (*Ss,* Fig. 24) that opens into the tube.

It is possible that the connecting duct is a remnant of the seminal duct, otherwise it is difficult to imagine how it may have evolved. If so, it is a plesiomorphic character, in comparison to the totally reduced seminal duct present in most Oonopidae. Thus, genera possessing this character are not necessary members of the same group (monophyletic).

Spermatheca/receptaculum: Burger et al. (2003) called the column-shaped, most sclerotized structure in the central part of the genital area the spermatheca. However, such a small spermatheca is not large enough to receive all the seminal fluid stored in two male palps. It seems that the true spermatheca lies behind the epigastric furrow and is weakly sclerotized (cf. Figs 18–22 in Platnick and Brescovit 1995 and Fig. 23 (*Re*)). Platnick and Brescovit (1995) described spermathecae as the "Anterior portion of female genitalia with single anterior receptaculum, expanded distally, pair of sclero-

tized lateral plates, and single, circular, sclerotized median plate; posterior portion with globose, membranous median receptaculum".

Remarks on the relationships between *Megaoonops* and *Tapinesthis*.

While comparing this new genus with other genera, we found that *Megaoonops* and *Tapinesthis* had very similar palps. In addition, the body size of both genera is relatively large, and both lack lock-spines. However, other characters suggest that they are not closely related. For example, *Megaoonops* has distinct spines on legs III and IV (absent in *Tapinesthis*), a male palpal femur with a heel-like structure (*He*, Fig. 25) (absent in *Tapinesthis* and other Oonopidae molles known to us), lacks a carapace pattern and has an entirely different epigyne. Therefore, the similar palps of *Megaoonops* and *Tapinesthis* males are as a result of convergence.

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